AMERICAN

DECEMBER • 1954

Cinematographer

THE MAGAZINE OF MOTION PICTURE PHOTOGRAPHY

This Issue . . .

- So You Want To Photograph Birds!
- Radio Communication In Film Production
- Photographing [illegible]

25¢

$3.00 YEAR

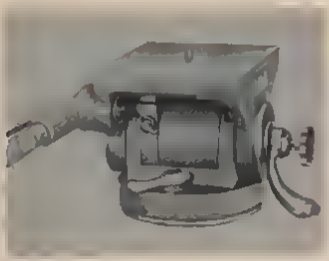
HOW TO GET A HEAD IN MOTION PICTURES

Selection of the proper camera head is important for smooth television and motion picture production. With the many types of heads available, it is often a problem to know which one will best serve the purpose.

Shown here are the various types of camera heads made by Houston Fearless. Each has been designed to fill a specific need. Each has its particular characteristics, features and advantages. The proper choice can be determined by the type, size and weight of the camera to be mounted, the camera accessories to be attached, and the types of shows on which it will be used.

Working closely with the motion picture and television industries over a period of many years, Houston Fearless has engineered this equipment for maximum ease of operation, smooth performance and complete dependability. Exhaustive tests have proved the metals and other materials best suited for the purpose. Precision workmanship assures years of satisfactory service.

Before deciding on a camera head, camera mount, or film processing equipment, consult your Houston Fearless representative. He will be pleased to analyze your requirements and recommend the equipment that will serve you best. Write or phone Houston Fearless, 11801 W. Olympic Blvd., Los Angeles 64, Calif., BRadshaw 2-4331. 620 Fifth Ave., New York 20, N. Y., CIrcle 7-2976

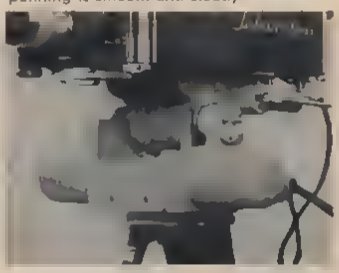


FRICTION HEAD. The most practical head for monochrome TV cameras and motion picture cameras weighing between 80 and 150 lbs. Provides smooth, easy panning and tilting. Pans full 360°. Tilts 45° up and 45° down. Adjustable drag and brakes provided on both actions. Camera is accurately counterbalanced. Adjustable to compensate for extra lenses, etc.

TILT HEAD. For fixed-position TV cameras or microwave parabolas. Friction-type action, but without drag adjustment. Camera or parabola may easily be positioned and locked in place. Calibration scales on both azimuth and tilt allow for quick re-setting of fixed points.

MONOCHROME CRADLE HEAD. Remarkable smoothness and ease of operation for black and white TV cameras are made possible by the perfect balance of the monochrome cradle head. The camera rotates around a constant center of gravity, always in absolute balance. Tilts down 38° and up 30° on ball bearing rollers. Tilt drag is adjustable. In panning, also rides on ball bearings. Brakes on both pan and tilt.

GEARED HEAD. Provides exceptionally smooth, constant-speed panning and tilting for television and 35mm motion picture cameras. Two geared speeds on both the pan and tilt. Gearing can be quickly disengaged so unit operates as a free head. In tilting, the head rotates camera about its center of gravity, maintaining absolute balance at all times. Full 360° panning is smooth and steady.



REMOTE CONTROL HEAD. Makes possible the operation of a TV camera from a remote point several hundred feet away. Panning, tilting, focusing and lens changing are accomplished with small electric motors operated from a portable control panel. Operation is smooth and steady. Speed is variable. Camera can be mounted in extremely high or low positions on stage, in auditoriums, stadiums, on rooftops and other inaccessible places.

COLOR CRADLE HEAD. Specifically designed for RCA color television cameras. Action is similar to monochrome cradle head. On both models, camera, with all accessories attached, can be balanced perfectly when mounted on the head simply by moving the top plate on the head forward or back with a lead screw. Adapted to fit all recommended tripods, pedestals or dollies.

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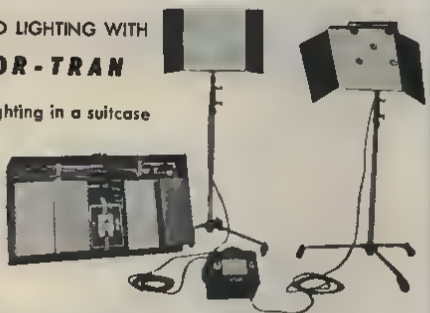

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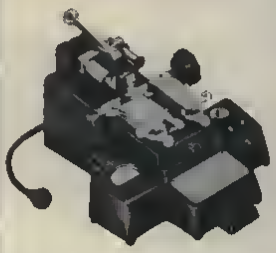

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THE MAGAZINE OF MOTION PICTURE PHOTOGRAPHY

PUBLICATION OF THE AMERICAN SOCIETY OF CINEMATOGRAPHERS

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ON THE COVER

SID HICKOX, A.S.C., and his camera crew photograph a closeup with the CinemaScope camera for the Warner Brothers color production, "Battle Cry," starring Van Heflin, Aldo Ray, Mona Freeman and Nancy Olson

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re: the Mitchell
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Hollywood
Bulletin Board

LEH ROOS (2nd from left), president of Kinevox, Inc., and Richard T Silberman, president of Kay Lab, demonstrate for members of the ASC the new Kinevox-Kay Lab electronic viewfinder for motion picture cameras. Others (from L. to R.) are John Arnold, Joe Alroc, Art Arling, Sam DeGrasse, John Day and Hal Holms.

ALSO demonstrated for first time before members of the ASC at the Society's November meeting was the new method for splicing motion picture film developed by DuPont. Making splice is DuPont's Bill Holm. Watching demonstration (from L. to R.) are Harold Wellman, Paul Eagler, and Edward Colmes.

An electronic viewfinder for motion picture cameras was demonstrated before members of the A.S.C. at the Society's November meeting by Len Roos, ASC, president of Kinevox, Inc., whose company engineered the finder in association with the Kay Lab of San Diego, Calif.

Virtually a miniature TV camera, the finder mounts on regular Mitchell finder bracket, replacing the optical finder. The pickup, which is in parallax with the camera lens, is viewed on separate monitors.

★

RKO-Pathe studios, later in the month, also demonstrated its version of an electronic finder for studio cameras. This method combines the Dumont Teleye, a miniature television camera, with a standard 35mm Mitchell film camera. The image is then viewed from adjoining monitors.

★

Russell T. Ervin, cameraman for Grantland Rice "Sportlight" films, has been admitted to membership in the American Society of Cinematographers.

★

Back from Italy is Harry Stradling, ASC, who has been shooting "Helen of Troy" in and near Rome for Warner Brothers. One of the industry's biggest productions to date, more than 200 persons were injured and 3 reportedly killed during the filming.

★

Arthur Lloyd, ASC, veteran director of photography who photographed many of the old Harold Lloyd, Snub Pollard and Our Gang Comedies, and who has been retired from active cinematography for several years, passed away unexpectedly last month. Lloyd also had served in World War II as Captain in the Signal Corps.

★

Wilton Holm, ASC, DuPont photo products representative, demonstrated a new method of film splicing before members of the A.S.C. at the Society's November meeting. The splicing operation involves a radically new type splicer, developed by Du Pont, which uses thin transparent tape, gummed on one side and perforated to match standard film perforations, in making splices. Splicer is especially adaptable to lab and process department uses.

★

Karl Struss, ASC, returned to Hollywood last month after an absence of two years. He had been in Italy where he directed the photography of seven feature films—two of them in 3-D and all in Ferrania Color. A rabid stereo fan, Struss shot over 3500 3-D slides in color while there. It was Struss' first trip to Italy since he photographed MGM's "Ben Hur" there about 30 years ago.

★

J. Burgi Contner, ASC, reports that as of November 1st, he directed the photography of 39 "Janet Dean, Registered Nurse" half-hour TV film productions in New York for Cornwall Productions. Series features Ella Raines. He has since signed with Information Productions, Inc., to photograph 26 "You Are There" half-hour TV film shows.

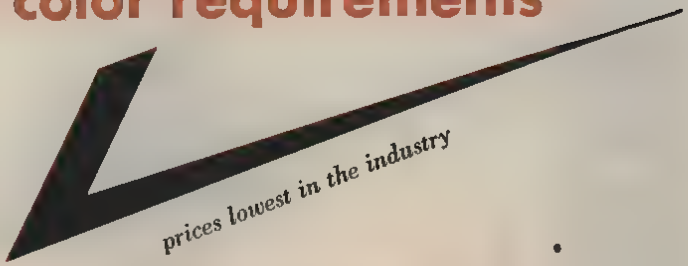
★

Ernest Haller, ASC, returned from Germany the latter part of November, where he had been directing the photography on William Dieterle's production of "Magic Fire" for Republic. Assignment included shooting backgrounds of many of the famous castles throughout Germany.

★

Sid Hickox, ASC, is being applauded by contemporaries for his photography of "Battle Cry" in CinemaScope and color for Warner Brothers. The battle scenes reportedly are some of the best photographed yet to be seen in any production.

Check your color requirements



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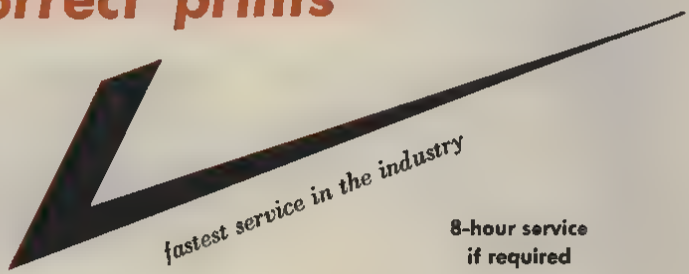

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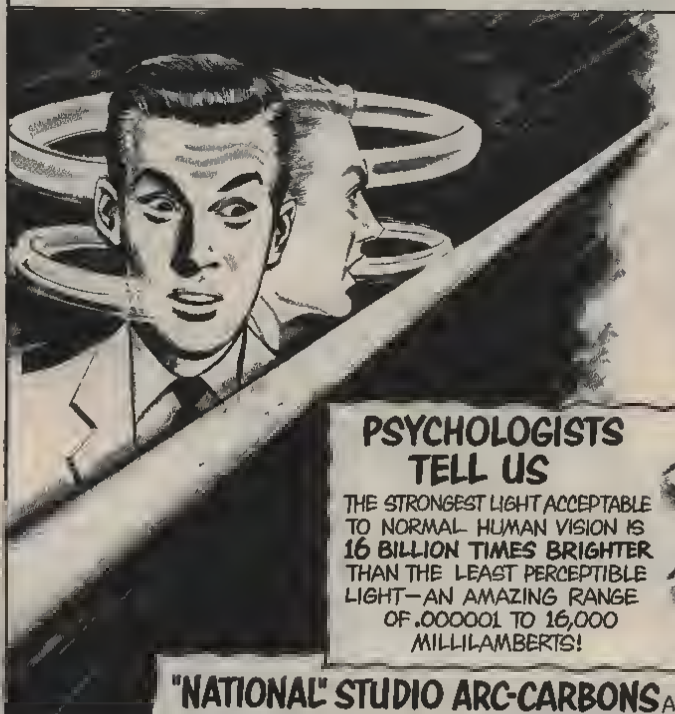

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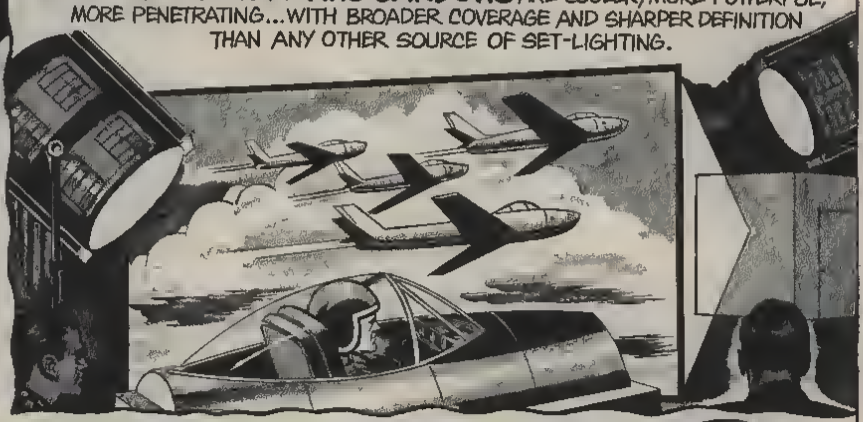

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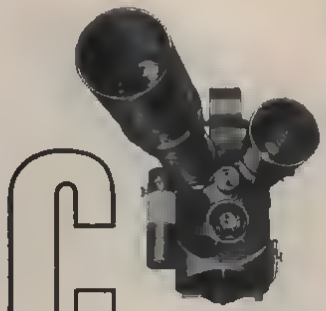

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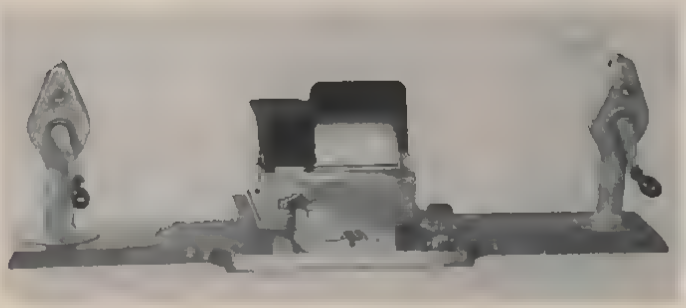
. . . in equipment, accessories, service



New Craig Professional Editor

Pro Film Editor

Craig, Inc., division of Kalart, Plainville, Conn., announces a new professional model of the Craig Projecto-Editor for 8mm and 16mm films. New model is aimed at needs of the advanced amateur and professional, supplying a large screen viewer. Complete unit pictured above, includes rewinds to take 2000-ft. reels. List price is $79.50.

Wide Screen for 16mm

Radiant Mfg. Corp., 2627 W. Roosevelt Rd., Chicago 8, Ill., announces a new semi-portable aluminum frame and projection screen in 6 by 16 ft. and 8 by 21 ft. sizes for use in 16mm CinemaScope and wide-screen projection. Screen is made of mildew-resistant beaded fabric, which is also flame resistant. Screen is mounted on frame by means of self-adjusting tension hooks, assuring a taut surface.

Telephoto Lens

A new Angenieux 3-inch f/2.5 telephoto lens for 16mm cine cameras has been announced by Bell & Howell Co., Chicago. New lens replaces the company's 3-inch f/3.5 lens, and is made exclusively for Bell & Howell.

New lens is a 5-element true telephoto with the distance from film plane to front of lens only 2.4 inches. Because of its compact size, it can be used on camera turrets without optical or physical interference in combination with most other lenses.

Iris click-stops range from f/2.5 to f/32 with a focusing scale from 4'

(Continued on Page 602)

New Radiant Wide Screen for 16mm Projection

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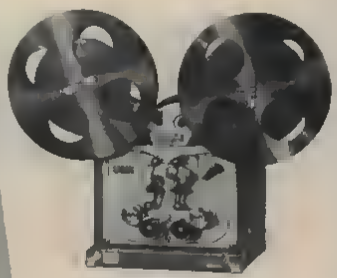

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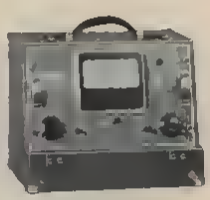

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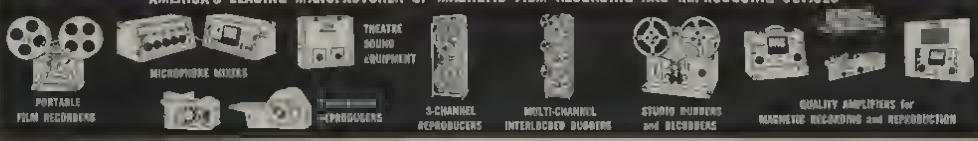

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WHAT'S NEW

(Continued from Page 598)

inches to infinity. The depth of field scale is clear and easy to read. Lens has a C-mount and rotating back for setting iris and focusing marks at the most convenient point. It retails for $99.50.

New Zoomar Offices

Zoomar, manufacturers of high precision lenses, has opened a West Coast branch office at 1586 Cross Roads of The World, Hollywood 28, Calif. Here a complete line of Zoomar products will be represented, including the new 8mm, 16mm and 35mm Zoomar lenses. Literature on Zoomar products is available from this new office.

Interval Timer

Anson Research Co., 4337 Clybourn Ave., North Hollywood, announces a new electronic interval timer for time lapse photography with 16mm cameras. The unit, which was demonstrated at the SMPTE convention in Hollywood in October, received wide acclaim. For literature and further particulars, write manufacturer and mention *American Cinematographer* magazine.

Animation Stand

Animation Equipment Inc., 38 Hudson St., New Rochelle, N. Y., announce the new Oxberry stand and compound for animation of films and slides. It features the exclusive Tri-motion which gives live motion effects for pictures by combining a number of image movements in the animation procedure.

Illustrated brochure and full particulars may be had by writing the manufacturer and mentioning *American Cinematographer* magazine.

Variable Shutter for Bolex

Tullio Pellegrini, 1545 Lombard St., San Francisco 23, Calif., announces a variable shutter for the Bolex H 8 cine camera. Installation of shutter enables H 8 owners to make fades and lap-dissolves in the camera, same as with the Bolex H-16 and Cine Special, etc. Cost installed is $99.60; on cameras having outside frame counter, cost is $109.80.

Magnetic Tape Splicer

F. Reiter Co., 3340 Bonnie Hill Drive, Hollywood 28, Calif., announces a ¼-inch magnetic tape splicer which automatically ejects, applies, cuts off, and presses into place the correct mount of splicing tape. Only three operations are required to complete a splice. Base size is 4¾" by 5¼". Finish is grey wrinkle enamel. List price is $69.75.

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Soundcraft coated films are made with the same superior magnetic coating used on Magna-Stripe, the development that won Soundcraft the coveted "Oscar" of the Academy of Motion Picture Arts and Sciences in 1953.

When you use *both* Soundcraft full-width film for original recording and Soundcraft Magna-Striped Film for editing and mixing, you are assured of maximum fidelity release prints without time-consuming, intermediate photographic-track processing.

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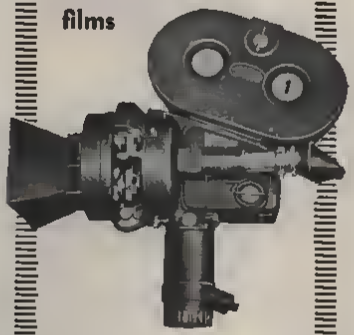

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INDUSTRY NEWS

Edwin Gillette, Hollywood cinematographer, has developed a method of producing composite shots and special effects particularly adaptable to 16mm color photography.

Tradenamed "Color-Mat" the method consists of an attachment which fits in front of the camera lens and features a unique method of making mattes and accurately positioning them to create the desired effects.

With the "Color-Mat" attachment, Gillette can combine live action with a still photograph, miniature, or scene from another location with no apparent line of demarkation between them. In this way it is possible to make so-called location shots without leaving the studio and without need for building elaborate sets, using process screens or optical printing.

According to Gillette, with this method it is possible to delete from scenes such unwanted features as waterfalls, buildings, telephone poles, trees, etc.

Although adaptable also to 35mm cameras, Gillette says the "Color-Mat" method is suited primarily to the independent, low-budget production shot in 16mm color, since this field does not share all the advantages of special effects departments, optical printing and process photography available to the major studios.

★

Development of "noise-free" light bulbs for use in motion picture studios has been announced by General Electric Company's lamp division in Nela Park.

To solve the problem of noise which was attendant to some incandescent photo lamps, rendering them unusuable on the sound stage, G-E engineers first conducted a series of studies to discover the source of the noise. Then they devised methods of constructing the large lamps in such a way that the noise was reduced to a point where it could not be detected by sensitive instruments even in a quiet studio.

Lamps which have been sound-treated include a 1000-watt general service lamp for TV, a 1000-watt 3200° K lamp for photography, and a 2000-watt spotlight also for photographic use.

★

Metro-Goldwyn-Mayer studios, until recently, had been using a regularly fitted 35mm camera alongside the CinemaScope camera on its productions in order to obtain standard prints of the same production, if needed.

Last month, the studio abandoned this practice. Following successful experiments by studio engineers, a method was devised for "de-anamorphosing" CinemaScope negatives to obtain standard 35mm prints.

Experiments in the studio laboratory with the recently installed Micro-Panatar printing lens, developed by Panavision Corp., showed that it was possible to obtain a "flat" internegative from the anamorphic negative and from this make standard prints.

★

National Carbon Co. reportedly is working on a new carbon for use in motion picture set lighting which is designed to balance lighting to 3200 K for color photography, when used in conjunction with incandescent lamps. Further tests are necessary, according to engineers, before the carbon goes into regular manufacture and distribution.

★

The Screen Producers Guild, Hollywood, last month announced the second annual Intercollegiate Awards competition for the best amateur motion pictures conceived and created in the colleges and universities in the United States.

In a letter of invitation mailed to 104 educational institutions, Arthur Freed, Guild president stated, "This is the first realistic and tangible contact that has been extended between professional film producers and students seeking to enter the motion picture field."

Any student-made film produced or completed during 1954 is eligible for entry. November 30 was deadline for applications; and December 31 is deadline for films.

Readers who are interested in the competition may write Arthur P. Jacobs, 360 No. Bedford Drive, Beverly Hills, Calif.

★

The new DuPont photographic film base, which the company has tradenamed "Cronar," will go into production in commercial quantities by the middle of 1955, following completion of a plant now under construction at Parlin, N. J. Limited quantities of Cronar have been made available for use as leader for motion picture processing.

CATALOGS & BROCHURES
available to readers

Lighting Control

A new "Handbook on Modern Stage Lighting Control" is available from Lumi-Tron Division, Metropolitan Electric Mfg. Co., Long Island 5, New York

For Better Color Pictures

A new Kodak booklet for the still photographer who wants to steer away from deep technical waters and simply produce better Kodachrome pictures is now available through Kodak dealers. Titled "How To Take Better Kodachrome Pictures," it is priced at 35¢ a copy.

Color TV Films

"Color Television Film Shooting Practices" is title of 14-page handbook prepared by CBS engineers and available to cinematographers in the industry through CBS Television Engineering Department, New York City.

Chapters deal with staging, lighting, cameras, film, and sound recording in color TV film production.

DuPont Film Data

A handy reference folder of technical data on DuPont professional motion picture films is available from the company's Photo Products Department, Wilmington 98 Delaware, and from its eight district offices.

Attractively printed in red and black, the folder contains sensitometric and processing data for DuPont's negative, sound recording, release positive, duplicating, and special purpose films.

The data sheets are punched for use in standard three ring notebooks.

Set Lighting Catalog

One of the most attractive and informative catalogs on motion picture set lighting equipment has been issued by J. G. McAlister, Inc., 1117 North McCadden Place, Hollywood 38, Calif. Illustrated and described are all of the lamps and equipment manufactured by the company with a detailed analysis of the proper uses and the specifications of each unit.

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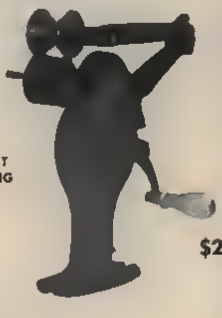

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Radio Communication In Film Production

The gaffer's chore is eased through use of wireless mike and short wave radio.

By LEIGH ALLEN

WITH THE DEVELOPMENT of the small, wireless microphone, Hollywood studios have been quick to adapt it to film production. One of the most interesting applications perhaps is the use of the wireless mike and short-wave radio as a means of communication between gaffer and electricians on the set.

The photos at the bottom of this page show the equipment in use by gaffers at Twentieth Century-Fox and Metro-Goldyn-Mayer studios. Other studios also using the equipment at this time are Universal-International, Paramount, and Columbia.

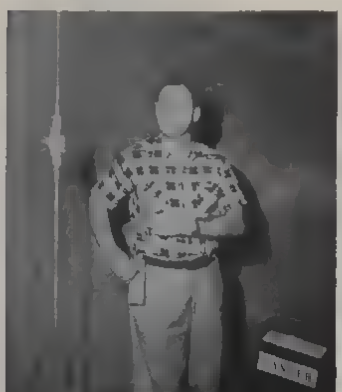
In nearly every case, the equipment used is that pictured in photo at right—the Stephens Tru-Sonic wireless microphone—manufactured by Stephens Manufacturing Corporation, Culver City, Calif. Crux of the system is the miniature combination mike and transmitter shown in right foreground. The similarly designed unit at left is a small battery which powers the mike and transmitter. Transmission range is approximately 500 to 800 feet.

In use on the sound stage, in a typical application, the mike is suspended from a neckstrap, and the battery pack is hung from the gaffer's belt, as shown in the photos. Here, it will be noted, a larger battery is used than that pictured in the photo at right. The small unit provides power for up to 4 hours continuous use; the larger pack, up to 30 hours.

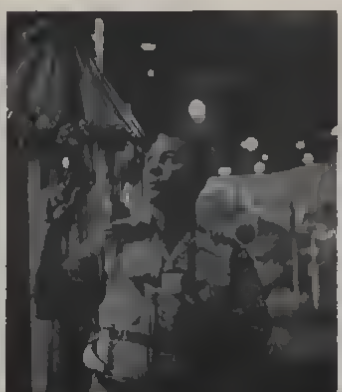
The gaffer (or other user) thus becomes a walking radio transmitter, able to broadcast messages to members of his crew located anywhere within the sound stage where signals are reproduced by remote speakers. Set up on the floor—usually as near the center of the sound stage as is practical—is a ver-

(Continued on Page 638)

STUDIOS are using this wireless microphone equipment for sound stage communication between technicians, also to eliminate the mike boom in certain types of shots. System includes power supply and monitor speaker in one unit, receiver, combination mike and transmitter, and small battery to power transmitter. Also included but not shown here is a vertical receiving antenna mounted on floor stand.



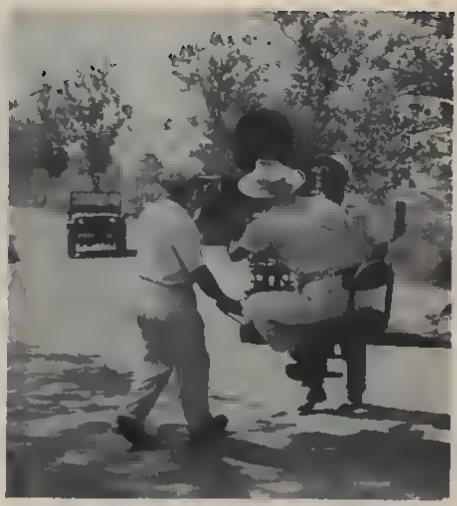
KENNETH LANG chief set electrician at 20th Century-Fox studios uses wireless mike to give instructions to electricians on catwalks above.



WITHOUT raising his voice above normal, Lang gives orders which are heard through speakers placed near workers on the catwalks.

CHESTER DAVIS, gaffer at MGM studios, Hollywood, also uses equipment. He shows small speaker through which orders are transmitted.

CAMERA ASSISTANT runs a tape measure to Dorothy Dandridge (Carmen) as director of photography Sam Leavitt, ASC (left), prepares to shoot scene on location for "Carmen Jones." At extreme right is director Otto Preminger, in background, Harry Belafonte



WITH CINEMASCOPE camera on boom, Sam Leavitt's camera crew shoots a scene on location. As Jeep approaches camera, assistants on either side of camera move the boom, enabling operator to follow the action.

'Carmen Jones'—CinemaScope Photography At Its Best

The pictorial and dramatic highlights of this picture are enhanced by a fine combination of skillful lighting and camera handling.

By ARTHUR ROWAN

PERHAPS NO PICTURE filmed in recent months so aptly demonstrates, as does "Carmen Jones," the ability of the CinemaScope lens to put on film with great dynamic flow and scope a story that is not necessarily a spectacle. Produced and directed by Otto Preminger for release by 20th Century-Fox, it was photographed in Eastman Color by Sam Leavitt, A.S.C., who previously had directed the photography of "A Star Is Born."

In this contemporary version of the famous opera "Carmen" told with Negro characters, the range, realism and intimacy of the CinemaScope lens presents the story on the screen as it never could have been done in the old "3 by 4" format. Not all the credit for the production's great pictorial success is due to CinemaScope, but thanks to this wide screen lens, both Preminger and Leavitt were able to undertake more daring treatment of the picture photographically and accomplish it with notable results.

The screen version of the famed Broadway musical, with its story in modern dress, follows that of the opera. Carmen (Dorothy Dandridge), elemental, passionate and selfish, is employed in a parachute factory; she seduces Joe (Harry Belafonte), a soldier on training duty there. To satisfy her desire to see Chicago, Joe goes AWOL and with her to the big city. But she quickly casts him aside in favor of a boxing champ riding the wave of success, who lavishes on her money and clothes in exchange for her company. Joe, with the MPs hot on his trail, follows Carmen to the fight arena the night of the championship bout, and after making a final plea for her return to him, strangles her to death.

A great deal of the story is told in the lyrics of the songs sung by Dandridge, Belafonte and others, and it is to the great credit of director Preminger that this was achieved so successfully. For he saw to it that the lyrics were so precisely sung that no one in the audience could fail to understand them and follow the story line.

The fact this was an independent production, perhaps, made it possible for the photography to reach the artistic heights that it did. Unhampered by the strict supervision of budget-minded unit managers which often hampers artistic endeavor on major studio productions, director of photography Leavitt found more freedom to pursue his photographic and lighting inspirations in working with Preminger—the only man on the production to whom he had to answer.

This freedom obviously paid off handsomely for Preminger, also, for "Carmen Jones" is replete with many beautiful lighting compositions, not to mention skillfully engineered boom and dolly shots which enabled the director to stage a musical number, a dance or a lengthy dramatic action in a continuous take running into minutes without a single cut. There are at least two that run 500 feet in length after editing.

It is perhaps these lengthy, continuous shots that highlight much of the picture and which demonstrate most effectively the true worth of the intimate, wide-screen CinemaScope lens in the hands of an able craftsman; and it is due to these continuous shots, which eliminated the need for so many intermediate camera setups, that the company was able to save much time and bring the picture in one day under schedule at a considerable saving in production costs.

One of the most impressive of these continuous shots occurs early in the picture when Carmen sings a tantalizing melody to Joe as he lunches with his small-town sweetheart. The setting is a large dining hall in the parachute factory. The scene, which plays for several minutes without a stop, begins with Carmen making a play for attractive Joe. As Carmen sings, she moves about the hall, stopping momentarily here and there, with the camera always upon her in medium or closeup format. A two-inch lens was used throughout the number with the camera mounted on a small crane. Leavitt and his crew panned, dollied, zoomed and followed Carmen, often moving in at a reverse angle to get an over-the-shoulder shot. A study of this shot on the screen also shows the painstaking artistry in the overall lighting which produced a fine, even level of illumination on all players no matter what the camera position.

VIEWING a scene from behind camera as it records a musical number being sung by group at bar, which includes Pearl Bailey and Dorothy Dandridge. Sam Leavitt is silhouetted at right of camera, director Preminger may be seen crouching in front of bright light at left.

One of the most dramatic follow shots to be seen in a long time takes place when Carmen and Joe are together in her mother's shack. As she is about to embrace Joe, she snatches a peach he has been eating and flings it over her shoulder. The camera follows it in a rapid pan to show it splattering on a large Zodiac map hanging on the opposite wall—an effect device to suggest Carmen's disdain for her superstitious mother's earlier admonition that trouble was brewing for her according to the stars. It is the dramatic suddenness of

(Continued on Page 625)

TWO SCENES from "Carmen Jones" notable for their lighting. Night exterior at left is courtyard in front of cafe where hoxer Husky Miller sees Carmen for first time. The effect lighting here is most natural. Scene at right is interior of boxing arena where spectators are gathered to see Husky Miller defend his title. Belafonte, behind column, is searching crowd for Carmen. This shot in picture is notable for the way lighting contributes to the scope and depth of the scene.

Big-scale University Film Production

Bob Jones University's Unusual Films studio is not only one of the best-equipped college film production units but its staff is one of the most versatile.

ONE OF THE MOST ambitious feature-length motion pictures ever undertaken by a university is *Wine of Morning*, the latest production of Unusual Films, motion picture division of Bob Jones University, Greenville, South Carolina. The story itself has all the essentials—suspense, intrigue, shipwreck, murder, love and redemption. It ties together many characters and incidents that are mentioned in the Bible—men like Barabbas, Paul, Manean, Barnabas, Pilate, Herod, Steven, and Joseph; also events such as the calling of Levi, the marriage at Cana of Galilee, and the Crucifixion.

The production involved 35 sound stage sets, an exterior construction providing nine different sets, and a number of location shots which were done in the surrounding countryside, also involved was a cast of 75 speaking parts and 800 extras.

The production posed all the problems usually encountered in making a top Hollywood Technicolor feature plus a few more which one would naturally expect for a production unit not having the unlimited facilities of a major studio. Yet it is surprising how shortcomings were so quickly remedied through the ingenuity and imagination of the remarkable group of people behind Unusual Films.

First there is Dr. Bob Jones, Jr., president of the university. For years he had wanted to write a novel based on many of the characters and incidents of Biblical times. Not until he began a slow recovery from a bout with pleurisy in 1950 did he find time to write his story, *Wine of Morning*. The year the book was published the university's Unusual Films studio was opened. One of Dr. Jones' most cherished dreams, the studio was established for the purpose of producing Christian and educational films of top quality.

Katherine Stenholm, who has been with the university for nineteen years, was appointed director. She had received considerable practical training in motion picture production from Rudolph Sternad, production designer for Stanley Kramer in Hollywood. She also took graduate cinema courses at the University of Southern California.

Bob Craig is chief cinematographer. Originally a member of the university staff, he gained considerable experience in

KATHERINE STENHOLM, Unusual Films' dynamic and versatile women director, gives last minute instructions before a take for Wine of Morning. Others, from left to right, are George Jensen on mike boom, Tom Woodward, script clerk, Robert Craig, cinematographer, and George Hess, assistant. The players are Al Carter (Barabbas) and David Yearick (Prince Menaen). The finely detailed set was designed and constructed by staff members of the university's film production unit under the guidance of director Stenholm.

ON LOCATION The Mitchell 16mm camera is mounted on a parallel for a series of panoramic shots of Roman soldiers in action in a chase sequence for "Wine of Morning."

SOME IDEA of the excellent period detail of the massive sets erected by Unusual Films technical staff is shown in photo above. Note the professional lighting and camera equipment being used.

ANOTHER EXAMPLE of meticulous set construction. After studying Hollywood set construction methods, Unusual Films studios technicians utilized them to reproduce this set of a Roman castle.

IN AN UNDERGROUND tavern set made of plaster and sawdust, Barabbas overhears his capture being plotted by talkative Roman soldiers. Note the excellent lighting achieved here.

photography during World War II, and subsequently trained in Hollywood.

George Jensen, another Bob Jones graduate, is film editor, his assistant is Thomas Woodward. Sound engineer is Rodger Groff; Lois Nichterlein is make-up supervisor, and Murray Havens is art director. Production manager is Melvin Stratton. Others on the production staff include Alice Gromley, script, Margaret Hurlston, secretary; and Marilyn Jensen, Laura Fleming and Verle Kippenham. In addition to the regular staff members, there are hundred of students who volunteered to work in the film department.

From the very founding of Unusual Films, several events have come to pass that justify the studio's very unusual name. Unusual Films is reported to be the very first to start production of films employing magnetic sound, and to continue with it until the production is ready for the final transfer to optical. One of the big handicaps recognized early in an operation of this kind was the absence of a satisfactory magnetic tape splicer. Members of the film production staff set about to solve the problem. The result is the now famous Bob Jones University Splicer. This is being marketed internationally by J. A. Maurer, Inc., New York.

Still another staff accomplishment was the building of a satisfactory magnetic sound reader. The readers that were then available were found to build up a static "hiss" during cutting operations.

While the bulk of the university's film production equipment was purchased in Hollywood or directly from manufacturers, still a great deal was built by the staff. One unique piece was a 12-KW skylight which was patterned after those built by MGM and described in the December, 1952, issue of *American Cinematographer*. In another instance, the staff acquired a surplus government generator truck, installed in

(Continued on Page 624)

ADA AND DICK BIRD in quest of bird-life shots for a nature film. Once a professional 35mm cameraman, Dick Bird switched to 16mm photography, is presently shooting for Walt Disney.

Birds Of A Feather

Dick and Ada Bird's unusual nature films of birds won them assignments to film wild-life for Walt Disney.

By HARRIS B. TUTTLE
and
GLENN E. MATTHEWS*

OF ALL THE 16MM cameramen who are contributing unusual color footage for Walt Disney's series of True Life Adventures films, none, perhaps, is more unusual than Dick Bird. There are numerous instances where 16mm cameraman have graduated to 35mm, but Dick Bird is one of the very few 35mm professionals who gave up the old standard in favor of professional 16mm cinematography. Today, aided by his naturalist photographer-wife, Ada, Dick is gathering color footage in Northern Canada for future Disney short subjects.

During his youth Bird worked as assistant cameraman, as cameraman, then assistant director. For a number of years he was a photographer for Universal, Biograph, Mutual, Selig, Lubin, Thanhauser, and Essanay—which indicates how early he got his start. Later, he became a newsreel cameraman, working for Fox, Hearst-Tribune, Screen News, Pathe and others. Subsequently, he spent a lot of time shooting animated cartoon films, which were used chiefly for advertising.

Dick Bird became interested in photographing nature subjects just prior to World War II. A friend who was curator in the Provincial Museum in Regina, Canada—his home town—suggested that with all his professional experience he was ideally equipped to photograph nature subjects. Dick liked the idea but kept putting it off, believing that nature photography was easy—something he could turn to when he was old and retired from the strenuous work of globe-trotting with a newsreel camera.

He soon learned differently. On his first trip out on the prairie with his camera, he spied a chestnut-colored Longspur carrying food to her young. He decided to film a story sequence on the behavior of the parents, feeding their offspring, what they ate and how much. The bird led Dick Bird around in circles for hours without disclosing the location of her nest. He cussed himself for his incompetence in permitting another bird to outsmart him. Later, quite by accident, he did locate the nest and spent the rest of the day trying to get satisfactory shots of the offspring, but without success. Right there he lost some of his egotism and all feeling of superiority as a human Bird over birds of the field.

Since then, Dick Bird has not only exposed countless thousands of feet of 16mm color film on nature and wildlife subjects, but he has gained considerable knowledge of the habits and habitat of his camera subjects. Nevertheless, he often encounters disappointment.

Today, his wife, Ada, is his inseperable companion on wild life filming expeditions. And a nice thing it is, too. For often it is necessary to wait long periods at a time and in all kinds

(Continued on Page 638)

DICK BIRD studies a subject for one of his films at close range—a young double-crested cormorant.

*Based on the article, "Birds of A Feather" by same authors, *PSA Journal*, February, 1953.

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SHOOTING A TV film series in 16mm. Featured is the venerable Model T Ford which serves as a vehicle to carry the personalities to interesting scenic spots which the film illustrates and describes. Behind the cameras are the author (far right) and Larry Washburn. Each film in series is 13 minutes in length and photographed on regular Kodachrome.

Shooting A TV Film Series In 16mm

By DUDLEY M. WHITTELSEY

THEODORE LINCOLN JONES, a pioneer American name if there ever was one, happens in this instance to belong to a spry and adventuresome 1915 Model T Ford car. I say adventuresome because the Ford is starring in a new series of 13-minute TV films being produced in New York by Club Productions.

The photography of the first episode of the series posed something of a challenge. We worked from a shooting script, but many sequences were born on the spot when they were introduced as spontaneous suggestions. We kept two cameras "hot" at all times, for time was of the essence if we were to take advantage of the good weather that prevailed during the major portion of the filming.

Camera equipment consisted of a Cine Kodak Special, with 15mm and 25mm Ektar lenses on the turret, and a Bolex H-16 with a 15mm f/2.8, a 25mm f/1.5, and a 63mm f/2.7 lenses on the turret. Since the Bolex afforded a wider range of lenses on the turret, this camera was used mainly for medium and close-up shots, with the Special being used almost exclusively for establishing shots and long running scenes.

An interesting innovation we employed may be of interest to other 16mm cameramen. To give added rigidity to the tripod on which the Bolex was mounted, it was weighted down by

(Continued on Page 637)

HOW TRACKING shots were photographed. The camera was mounted on tripod securely tied down to floor of car trunk compartment and focused on the Model T, which followed.

SHOT SHOWING the car occupants pushing vehicle out of sand. Car was pulled by cable by another car, while occupants went through motion of pushing. The tow-line was omitted in the camera framing.

LINING UP his 9.5mm Paihe cine camera for a shot for his all-model-and-miniature film, "Victory Convoy," is Aivar Kaulins of London, England.

Models And Miniatures In Movie Making

By HAROLD BENSON

THE LIMITATIONS of the amateur make it almost impossible for him to shoot and intercut model scenes with real-life action so that his audiences are unaware of the transition. Aivar Kaulins, an eighteen-year-old Latvian now living in London, had always wanted to make a short war film, and he knew it would probably necessitate the use of models for a large proportion of shots. But then he had also always wanted to make a model film.

He decided to combine the two ambitions in one production by making an all model film which looked deliberately artificial. By making a virtue of the difficulties of getting a model to look exactly like its actual counterpart, Kaulins is now nearing completion of a 300 ft. story with a style all its own. From the first shot to the last there is no attempt to cover up the fact that models are being used.

The cut-out characters have no form of separate limb animation. A simple gliding motion is effected by the usual single-frame technique, with the result that the whole production has a deliberate lack of realism as pronounced as that of some cartoon and puppet films.

The story of *Victory Convoy* suits the style of the film. Apparently an action-filled drama, its final shots turn the tables on the audience and provide the justification of its artificial technique. The opening titles are superimposed over a shot of an approaching train. A German fighter swoops low over the train and returns to report to base.

Meanwhile a number of large crates are taken from the train and loaded by Allied troops into a lorry. Each crate is labeled "Urgent," "Top Secret," "Allied H.Q.," etc. The lorry sets off, guarded by a tank and an armored car. Suddenly the shadow of a bomber crosses the convoy's path, scores of paratroopers leap from the plane. The Germans take over a house and erect a road block as the convoy approaches.

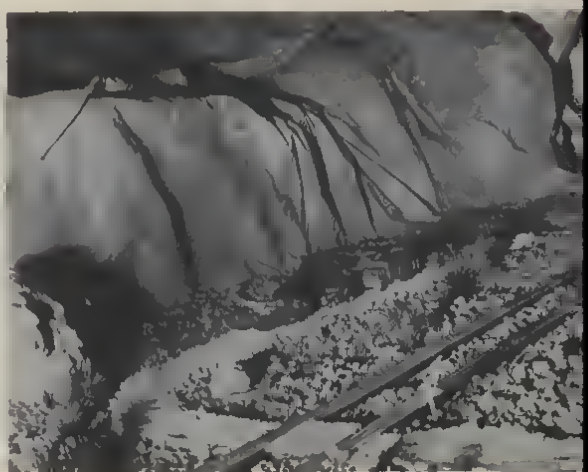
During the battle that follows, the lorry crashes into a ditch, but the tank and armored car prove too much for the Germans, who surrender. The tank pulls the lorry from the ditch, and as it does so one of the crates falls from the back and bursts open—to disclose hundreds upon hundreds of glamour photos! "And thus," says a concluding title, "the precious cargo was saved and victory assured."

Originally Kaulins intended to shoot the whole film out of doors, but the notorious English weather—which makes the completion of any film involving exteriors something of a miracle—finally beat him. However, after carrying over a dozen buckets of sand up into the loft of the house (with noticeable effect on the ceiling below), Kaulins prepared an interior miniature road and railway track. Bushes and trees were added with the aid of a few tiny plants.

The first snag arose in trying to get the electric train to run smoothly over the rails on their uneven surface of sand. Luckily Kaulins has infinite reserves of patience—essential to any amateur who embarks on a production involving single frame animation—and he soon solved the difficulty.

Working in the cramped loft meant that practically every shot had to be a closeup. However, Kaulins did manage to

(Continued on Page 640)



MINIATURIZED set constructed by Kaulins for "Victory Convoy" utilized model trains and track, as well as automobile, tractor and tank models. Photoflood lamps furnished the lighting.

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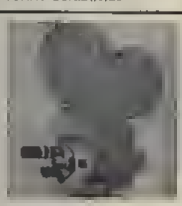

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You've got to outsmart 'em, and the best way to do it is to shoot from a blind or at a distance, operating your camera by remote control.

By HERBERT D. SHUMWAY

Photographs by the author.

FEW FIELDS of nature photography offer greater challenges to the outdoor-minded camera fan than does the provocative pastime of bird filming. There's a fascination about this pursuit with camera and color film that's enticing an ever-growing number of cine photographers to pit their skill and equipment against the behavior of the wary denizens of the bird world. Bluebirds and robins, bluejays and cardinals, flickers and warblers—there are just a sampling of the many brilliant birds near at hand in America to make bird photography the colorful, exciting, and rewarding hobby that it is.

To those who have never filmed birds, the question always arises as to how

FIG. 1—Filming from a blind will not get tured here is constructed of burlap stretc frame. Camera is set up inside and fo

closeup shots of birds are obtained. All too often the general impression seems to be that super powerful telephoto lenses do the entire job. Actually, helpful as telepboto lenses may be, they alone seldom are responsible for intimate views of birdlife. In order to film a sizable image, even the use of a telephoto lens requires that the camera be relatively close to such a tiny creature as a bird. For instance, when a cine camera is fitted with a three-power telephoto lens, it must still be placed within five feet of a nest in order to get a screen-filling image of birds as small as sparrows, chicadees, and warblers.

Needless to say, it just isn't possible for the photographer to approach that

on the construction very close to the nest of a cloth-covered structure, a "blind," to conceal both the camera and its operator during filming sessions. The other method depends upon remote control operation of a camera which has been tripod-mounted near a nest, and with its lens prefocused upon a point on which the bird regularly perches. Then, whenever the bird returns to that particular spot, the camera shutter is operated by remote control from a distant viewing point.

their own filming. Basically, blinds are constructed of cloth or burlap fastened to a frame of lightweight wood or metal. A blind must be designed for easy portability. This means it must be assembled and disassembled easily and quickly, because often the blind must be hauled through fields, woods, and swamps to be erected at each new nesting site. Anyone handy with ordinary tools can quickly build a suitable blind such as the one pictured in Figure 1.

(Continued on Page 630)

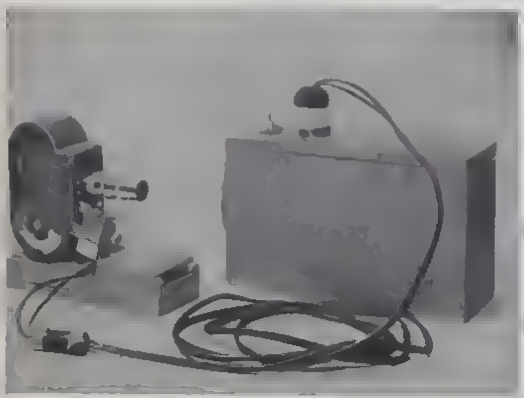

FIG. 3—A remote control and camera for filming birdlife at close range. Camera-operating solenoid is activated by toggle switch on the battery box. Note that a telephoto lens is mounted on camera.

FIG. 4—The remote controlled camera must be pre-focused and framed so the desired bird action takes place where camera will record it. Here a ruler is used to determine correct focusing distance

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Now, however, the Association of National Advertisers has published a new book, "The Dollars and Sense of Business Films," which for the first time provides heretofore confidential data on actual production, print, distribution costs and methods for advertising and public relations films by 67 of the nation's leading companies.

Based on a survey of 157 non-theatrical films representing a total investment of $12,000,000, this 128-page book is going to make businessmen sit up and take notice. It will have its effect on film producers, too. Among eye-opening points are these:

The typical company spends only 4.6 cents to obtain an average of 26 minutes of a viewer's time to tell the company's story.

The cost per viewer can drop to as low as 3-mils over the life of the film if a good film is made for a broad, general purpose audience.

The average film has a long useful life—usually five years, often more.

When films are in circulation for over 10 years, the cost-per-viewer may drop to as low as ½-cent.

It is possible to produce successful non-theatrical films for $25,800, the median cost in this study.

The study shows a film can be expected to reach an audience of 276,036 in a year, although audiences of up to 1,548,000 have been booked, all depending upon the nature of the film story and the target audiences.

Based on the work of the A.N.A. Films Steering Committee, chairmanned by John Flory of the Eastman Kodak Company, the book is the result of more than two years' efforts aimed at putting pertinent data in the hands of those people who are investigating the possibilities of non-theatrical films as a solution to their communications problems.

The book reveals a number of important findings. Of the films surveyed, color films are favored nearly four to one. The median running-time of the picture is 26 minutes. While 91% of all films surveyed are circulated in part or entirely by the sponsoring company, one-third are also handled by commercial distributors.

A typical sponsor spends 55% of his budget for the production itself; release prints account for 25%; and the final 19% is located for distribution. Considering that this survey includes a number of specialized films intended for distribution to selected audiences, the over-all average cost-per-viewer of 4.6 cents is equally interesting. This figure includes production, prints and distribution costs, and represents normal circulation—not including television.

The study also reveals that most sponsors design their films so that they will have a long life—at least five years. In this way, the pre-viewer cost of the film attains a maximum economy. For example, the figures given, though they represent a fairly small sample of the various types of distribution and target audiences, show that for those films in circulation up to one year, the cost-per-viewer amounts to 97 cents. For those circulated from 1 to 2 years, the cost-per-viewer is less than 7 cents.

Additional detailed information is offered in the book's summary of findings. Among these are: 99.4% of films surveyed are released in sound; 95% are 16mm prints; total production cost of 116 of the films is $4,514,477; production costs ranged from a low of $1,732 to a high of $426,600, with a medium cost of $25,800.

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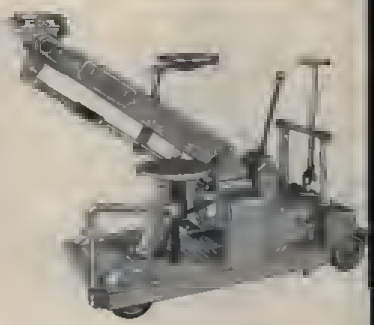

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BIG SCALE UNIVERSITY FILM PRODUCTION

(Continued from Page 613)

it a 25-KW A.C. gasoline generator and two diesel generators of 30-KW each to supply power for location shooting.

The staff then tackled the construction of a multi-directional dolly, similar to Rosie's Dolly described in another issue of *American Cinematographer*. They also fabricated 200 feet of track for same, built four set jacks for moving flats, and constructed a four-blade wind machine patterned after those used in major studios.

In a far corner of the scene storage shed, a D.C. motor generator was set up to provide power for set lighting. Although it was mounted on cork slabs, it was necessary also to construct a fiberglass blimp to minimize operational sounds.

A problem in sound occurred whenever an arc was struck: the burning carbon produced a high-frequency squeal. Staff members came up with a remedy. A filter made from an old line transformer and some condensers successfully eliminated the unwanted noise.

The studio's inventory of equipment also includes a camera crane, a 16mm Mitchell, 16mm Maurer, and Bell & Howel 16mm cameras; five Stancil-Hoffman 16mm double-sprocketed magnetic film recorders and playbacks; a Western Electric recording console; Eastman Model 25 and Holmes arc projectors; plus the necessary interlock systems. Other lighting units, not already mentioned, include 52 pieces of assorted Mole-Richardson equipment.

Two years before actual shooting began on *Wine of Morning*, the original screen play and all drawings for the exterior sets had been completed. A great deal of research went into the planning of costumes, all of which were made by staff members especially for the production. Basic scenery pieces were constructed so they could be used in different combinations. Since many of the sets called for stone walls, special attention was given to casting the replica material. A framework of 2 by 4's was covered with plaster which was molded in the shape of limestone blocks. From this mold, a genuine effect of a massive limestone wall could be obtained, and inexpensively, too. The wall segments were made by using old burlap bags soaked in molding plaster. These were spread over the negative mold and allowed to set. Actually, two molds were used; they were so designed that the finished castings could be used alternately and upside down in order to provide an un-repetitious effect in the stone pattern. The castings, which incidentally cost about 30 cents each to make, were then nailed to frames and painted.

Squares of Masonite wallboard, 4 by 4 feet in size, were marbelized in lacquer in two basic color combinations to provide tiles for a variety of floor designs.

There were many times when shooting could not be done according to standard procedures — if, indeed, there be such a thing. During the filming of the crucifixion scene, for example, the greatest problem encountered was how to produce the earthquake effect. Here again, reference to a back issue of *American Cinematographer* provided the answer; a camera-vibrating gadget was built—similar to the one MGM constructed for "Battleground" and which was illustrated and described in the January, 1949, issue of this publication. By carefully synchronizing the vibrations with the reactions of the characters in the scene, a tremendously realistic effect was produced.

Near the end of the picture there is a scene in which a ship hits a reef during a storm. This called for the employment of special devices to produce the desired realism. A steel fulcrum was fabricated so that the 12 by 10 foot platform on which the ship's cabin was built could be rocked. The entire cabin was lifted onto the fulcrum with a highlift and adjusted to the approximate center of gravity. Stops were nailed in place to keep it from slipping, and a large coil spring was mounted on each end of the platform to serve as a limit. Two long timbers were extended from each end of the platform to increase the leverage.

During filming of the scene, when the ship hit the reef the cabin was tipped to its limit. The character Barabbas in this scene was hurled against a breakaway table. He scrambled to his feet and started up the ship's ladder. Then, as if the wreck had been hit by a huge wave, 200 gallons of water cascaded

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down the narrow passageway hurling Barabbas back into the cabin.

There are some intricate crane shots in the picture which compare in technique to the best seen in Hollywood productions. Several involved lengthy, sustained action and careful cueing.

In any modern film production, of course, music is of prime importance. The task of preparing this fell to Dr. Joseph Schmoll of the university music faculty. After composing the score, Dr. Schmoll selected and rehearsed forty members of the university orchestra and a choir of fifty voices, after which the score was recorded.

And so the many problems involved in shooting *Wine of Morning* were met and solved one by one. Almost every staff member doubled or trebled in brass at least once during the production. Keen satisfaction was derived by all in the knowledge that their work will be used in Christian service—the purpose and reason behind Unusual Films.

CARMEN JONES

(Continued from Page 611)

this camera action and the abrupt revelation at its conclusion that gives great impact to the scene.

The location of this shack, incidentally, was the scene of another photographic highlight. Actually situated in a shanty-town street in a small town east of Los Angeles, the Preminger company had arrived there late in the afternoon. By the time camera and other equipment had been unloaded and set up, the sun was well below the accepted meridian for good color photography.

Director Preminger decided to make the shot anyway and rehearsed Carmen and Joe in the important scene showing the couple arriving in Carmen's home town. As the couple trudge down the road toward the mother's shack, Carmen is greeted by old friends and presented with gifts of food. By the time the scene was ready to be shot, it was already 7 p m. The sun was low, decidedly on the red side, and not too many booster lights were available.

Still, Preminger decided to risk the take and told Leavitt to do his best. The resultant shot proved a tremendous delight to both of them, for it had just the right feel of dusk—a pictorial and lighting quality that could not have been duplicated with tricky artificial illumination. It was just another instance where the company dared try, and was well rewarded.

Because the production from start to finish is especially notable for its interesting lighting and camera technique, these two facets of the picture deserve

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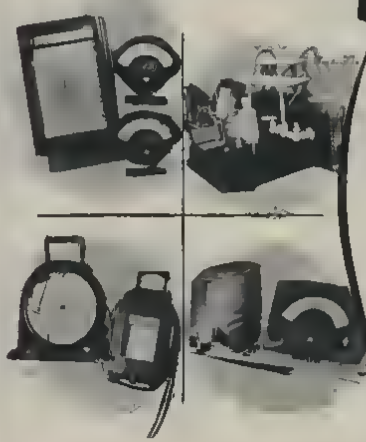

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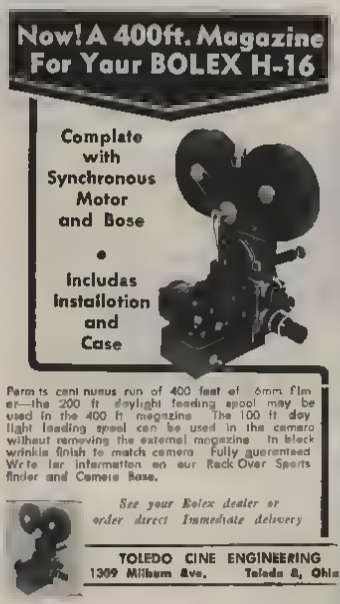
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additional analysis. Students of cinematography will especially like the unique follow action of the camera in the scene where Carmen, now living with Joe in a third rate Chicago flophouse, flounces out of the room after an argument with him and runs down the stairs to a telephone on the landing below.

Here the camera, close upon her at the start of this action, moves briskly through the door as she exits and follows her in the flight down the stairs and continues to zoom further as she starts to dial the telephone. The impact of this camera treatment here is terrific and greatly heightens the dramatic effect of the action at this point.

Another unusual camera manipulation occurs when the group of girls, visiting the fighter, Husky Miller, in his lavish hotel room are telling fortunes with cards. Suddenly, Carmen, who until now has been a disinterested spectator, suddenly moves to the table, sits down and picks up the deck of cards. As she does so, the camera simultaneously zooms in and lowers to a new level to frame a dramatic closeup that starts a new song by Carmen.

While a great deal of the picture calls for nothing more than routine standard lighting, there are instances where imaginative set illumination is employed to build or sustain a mood. An outstanding example is the exterior setting where Husky Miller makes his initial entrance in the picture. In the background is the cafe where Carmen and Joe have met, loved and quarrelled. As Miller enters the scene in his expensive foreign sports car, a crowd of admiring fans gathers around him. The camera moves from a medium shot of Carmen on the cafe veranda and works its way eventually to a closeup of Miller. What Leavitt accomplished here was a genuine feeling of night time, yet all the Negro players are so subtly lit that each face is easily distinguishable; there is none of the forced illumination nor any of the spurious night effect lighting that so often characterizes a color production. *(Continued on next page)*

Quad-lite—Economy Set Lighting Tool

AL LANE, set electrician at MGM studios in Hollywood, points out rugged quad-lite which that studio engineered and built for standard set lighting use. Quads have sockets for four photoflood lamps, switches to control lamps in pairs. Housing is all aluminum and has regulation fitting and swivel fitting for use on regular lamp standards. Heavy wire brackets at either side of lamps protect them from damage.

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Because director Preminger had chosen to shoot so much of the picture in natural locales, lighting became an even greater challenge when working in these setups. A great deal of the closing action takes place in a boxing arena frequented by colored people. These scenes were staged inside the Olympic Auditorium in Los Angeles. One of the impressive things the photographic minded reader will note when seeing this picture is the great depth of perception that was achieved in the mob scenes of the spectators seated in the auditorium. Very few scenes of this kind filmed in black-and white have ever shown such vast crowds; the camera never seemed to reach back into the dark recesses as did Leavitt's CinemaScope camera in these scenes. The result is that one appreciates more what can be done today with color film and moderate lighting in recording difficult scenes of this kind.

A discussion of this phase of the photography would not be complete without dwelling a moment on the lighting of the arena between rounds of the climactic championship bout. As most readers are aware, fight arena house lights are all but extinguished between rounds of a bout, with only the lights above the ring left on; at the end of each round the house lights are turned on. *(Continued on next page)*

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Leavitt achieved this effect very successfully by having his lighting circuits divided so that the audience section of the background could be dimmed at the sound of the judges' gong. At no time, of course, is the lighting entirely extinguished, and it is possible to distinguish spectators not only at ringside but in the row of seats far at the rear. This enabled Preminger to get from his spectators the audience reaction so necessary to building suspense at this point.

The recording of the fight action between Husky Miller and his challenger is a terrific bit of photography, and yet it was quite simply achieved. Here, by virtue of the CinemaScope lens, it was possible to shoot the entire action from a single vantage point, without need for moving the camera at any time. So intimate and revealing is the scope of the wide screen lens that you see every bit of the action without the need for cuts to closeups. Perhaps the most distinguished thing about the photography of the fight scenes is that hand-held camera shots were studiously avoided. As a result, the scene is as dynamic as it is different.

Probably the most challenging sequence to be filmed was the group of scenes which became the climax of the story—the meeting of Joe and Carmen at the fight arena and the strangulation that follows. Director Preminger choose a vacant refreshment stand in the arena auditorium as the locale for this action. The stand, a niche in the massive concrete structure barely 8 by 12 feet in size, had a narrow door opening on the main corridor and a window above a counter through which drinks and sandwiches normally are dispensed. For the scenes, the window was shuttered and the door unlocked. As Carmen is descending the stairs after the fight, Joe confronts her suddenly and pushes her through the door and into the small room, and begins his plea for Carmen not to forsake him.

Here the photography followed a carefully planned pattern—a continuous shot; no cuts. The camera was mounted on the small boom, with the boom raised and extended through the window. The lighting, keyed perfectly to the somber mood of the action, was accomplished with only six small lamps.

It was in the closing part of the scene played here that the ingenuity of the camera crew was taxed to the limit to

Uses Bucket For Underwater Shots

BUCKET FISHING with a camera is one of the ways in which travel film producer-photographer Julian Gromer captured the submarine beauty of the Florida Keys on film. With his cine camera secured inside the glass-bottomed bucket, Gromer gets undersea shots without getting wet. He recently completed "Keys To Adventure" for makers of Mercury outboard motors, the film contains one of the finest tarpon fishing sequences ever recorded.

achieve the type shot desired—a follow shot of Joe in a rage strangling Carmen, then as the two sink to the floor, of Joe rising slowly as the MPs arrive to take him away and of Joe as he sadly walks out and down the corridor. Here the camera had to perform a "snake" shot—that is, on the boom, it was extended far inside the stand; then as Joe rises and exits, it moves forward to the very limit, then twists sharply to the left to catch him exiting the door.

There are more, many more instances, of course, of brilliant camera handling in this production; but those described here should prove sufficiently intriguing and suggest such educational possibilities for the student of cinematography as to warrant a special study of the entire production on the screen. It is easily one of the year's better films.

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SO YOU WANT TO PHOTOGRAPH BIRDS!

(Continued from Page 691)

Once the blind has been erected, there is often a long waiting period before the birds become accustomed to it and return to their normal activity. Sometimes it is necessary to erect the blind several days in advance of its use in order to allow the more timid birds time to accept it as harmless. Once the birds do return to their nest, however, the cameraman seated inside the blind has an unexcelled view of everything that is taking place before the lens of his camera. It is this opportunity to film in detailed closeup all the beauty of birdlife that makes bird photography so exciting, so much fun, and so well worth the time and patience it requires.

In many locations, however, the use of a blind is impractical. Such is the case when the nest is high in a tree or bush. In other instances the nest may be located so far off the beaten path that it will be both difficult and time consuming to set up a blind. Under such conditions bird filming by remote control is the logical solution.

With a simple remote control device almost any movie camera may be operated at distances of fifty to one hundred feet. No blind is needed for concealment of the camera as long as the operator remains reasonably quiet and motionless. It is surprising how quickly most birds recover their confidence after a small, motionless object such as a tripod-mounted camera has been placed near the nest. Usually within twenty or thirty minutes they have lost all fear of it and are again feeding their young. Because the camera can be placed very near the nest without alarming the birds, remote-controlled filming enables extreme close-up bird photos to be taken with the use of relatively inexpensive low-power telephoto lenses.

Now, how does one adapt a camera for remote control operation? One very dependable method relies upon electromagnetic tripping of the shutter. In its simplest form this is accomplished by mounting an electromagnet (or solenoid) on the camera in such a position that it will trip the shutter release lever whenever current is sent through the coils of the magnet. Thus the camera may be operated from quite a distance merely by running wire from the shutter-operating magnet to a combined battery box and control switch.

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PART OF the success of any newsreel or documentary film photography can be credited to the use of varied camera angles. The Yale & Towne Mfg. Co., Philadelphia, demonstrated this recently when one of the company's fork lift trucks with special platform was pressed into use by a cameraman covering a big outdoor get-together for employees at the Y & T plant. The camera was raised or lowered smoothly and with ease, and dollied back and forth, giving the cameraman all the maneuverability achieved in major studio sound stages.

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The details of adapting any particular motion picture camera for remote control operation will vary from camera to camera. Those cameras having release levers which require but little pressure to trip are best suited for remote control filming. In most cases an arrangement whereby a solenoid pulls down a lever which, in its downward thrust, trips the camera release lever will be best. The lever must be spring-mounted so that it will spring upward when current is no longer applied to the solenoid. Such a simple arrangement, illustrated in Figs. 2 and 3, permits the camera to be started and stopped at any instant from any distance. Both the camera and the solenoid are mounted in alignment upon a common base of wood or metal into which a ¼ 20 hole has been tapped so that the whole unit may be threaded onto a tripod.

Since remote control operation often demands long distances between battery control box and the camera operating solenoid, the voltage supplied must be great enough to insure precise and consistent operation of the unit. Various combinations of solenoids and camera release lever resistances may require more or less voltage for best operation. If a stronger "pull" by the solenoid is needed to start the camera, it may be obtained by increasing the voltage supply. Too great a voltage, however, may cause the solenoid to overheat. Test any arrangement thoroughly before taking it into the field for actual bird filming.

Pondered by many who have a yearning to photograph birds is the all important question of the equipment required. Happily such equipment doesn't have to be elaborate and it doesn't have to be expensive. Often the 8mm or 16mm camera one already uses can be readily adapted for a wide variety of bird filming, so let's consider the basic equipment necessary to enjoy this fascinating pastime.

Cine filmers will find that a telephoto lens of moderate power will be required for bird photography, for the camera must be placed far enough from the nest to prevent the whir of its motor from alarming the birds. At this distance the lens must possess sufficient magnification to record a large, detailed image of the bird. For most bird movies a three-power telephoto lens (1⅛-inch focal length for 8mm cameras, 3-inch for 16mm cameras) will be entirely adequate.

Telephoto lenses for motion picture filming of birds should be as "fast" as one can afford. This is true because all filming of birds must be done by natural light. Often birds build nests in locations where the light is poor; in

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other cases filming must be done on overcast days. Consequently lenses possessing maximum apertures of f/2.8 or larger are most desirable. Choose all telephoto lenses with a focusing mount to permit filming as close as five feet to the subject. In general, fixed-focus telephoto lenses are of little use for bird filming.

In addition to camera, lenses, tripod, and remote control equipment, every bird photographer should have a pair of good binoculars, those having a magnification of six to eight power are ideal. Not only are binoculars helpful in locating birds, but they are indispensable for observing the birds at their nests during the actual filming. Since the location chosen from which to operate a camera by remote control must be some distance from the nest in order to avoid alarming the birds, binoculars make it easy to see every movement of the birds. It's then a simple matter to determine the instant of the bird's best pose as the moment for tripping the shutter.

To many, bird nest hunting in itself is an absorbing pastime. To a bird photographer it becomes a necessity, for birds are most easily and most naturally filmed at their nest. Skillful as birds are in concealing their nests, they do furnish clues which ultimately reveal their hidden location.

These clues are easily detected when the parent birds are building their nests. With the aid of binoculars, look for a bird gathering bits of grass, sticks, leaves, and other nest building material. Then watch the bird closely as it comes and goes in order to pinpoint the exact location of its nest. Approach the nest slowly and quietly, for at this stage of nest construction many birds will desert a partially-built nest if they become alarmed.

A similar nest hunting system works equally well for the location of nests after the young have hatched. At this time the parent birds are observed as they carry insects to their young. A few birds fly directly to their young—their nests are relatively easy to find. Others approach their nesting sites only in an indirect fashion, landing first in one place, then flitting nervously to another, finally going to the nest itself by stalking through concealed pathways in the grass or by flying through nearby dense thickets. To uncover the nesting site of such wary, secretive birds demands the keenest and most patient observation.

Success with common birds provides excellent experience with which to tackle later the shyer, more secluded birds. For that reason beginning bird filmers will do well to confine their first film-

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ing sessions to the more familiar birds Robins, bluebirds, bluejays, flickers, and sparrows are just a few of the birds well-suited for beginning bird photographers. Not only are these birds colorful objects, but their nests are also easily found and filmed. Frequently their nests may be placed at low elevations. Bluebirds and flickers, for instance, often nest in holes only six to twelve feet above ground level. Many other species build nests low in bushes and thickets. Some birds, such as meadowlarks, towhees, bobolinks, and several of the sparrows construct their nests directly upon the ground.

Once a nest has been located, devote some time to observing the habits of the birds before actually setting up the photo equipment. Determine what branches and which sides of the nest are favorite perches. Then place the movie camera so that it is focused upon one of these favorite perches. Success with remote control bird filming especially depends upon correct anticipation of the exact spot upon which the bird will consistently alight.

Success too, depends upon flawless camera technique. Closeup bird photography demands precise focusing. Many movie cameras lack the accuracy and convenience of through-the-lens focusing. With such cameras always measure the exact camera-to-subject distance with a ruler or tape measure and set the focusing scale accordingly. Only accurate measurements will insure crisp focus. Never estimate subject distances—an error of just a few inches may be enough to throw the resulting bird picture badly out of focus.

Fine bird movies demand that the camera position be changed often during the filming session, usually each time the camera spring is rewound. Such change injects a variety of viewpoints into the film. For example, shoot opening scenes from a distance of ten or fifteen feet to picture both the bird and its surroundings. Such a scene constitutes a "long shot" when applied to bird filming. Then move the camera closer for succeeding views, climaxing the series with screen-filming closeup of the bird itself. Try especially for a few extreme closeups of the wide-open mouths of the young. Cut to a closeup of the parent, revealing in detail its bill full of worms and insects. Then photograph in medium shots the actual feeding sequence.

Such action-packed movie sequences demand time and patience to film. All are within the capability of remote control photography. To produce such a sequence necessitates shifting the camera

(Continued on Page 636)

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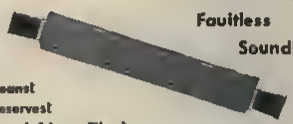

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20TH CENTURY-FOX

MILTON KRASNER, "The Seven Year Itch," color, CinemaScope.

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WILLIAM DANIELS, "The Shrike."

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WILFRID CLINE, "Third Girl From The Right," Technicolor

CARL GUTHRIE, "Kiss Of Fire," Technicolor, wide-screen.

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HARRY WILD, "Top Of The World," Landmark Prods., Wide-screen.

JOSEPH LASHELLE, "Marty," Hecht Lancaster Prods.

GILBERT WARRENTON, "No Place To Hide." Jos Shiltel Prods EastmanColor, Wide-screen.

LUCIEN BALLARD, "Magnificent Matador," EastmanColor, CinemaScope Nat'l Pics. Primero production for 20th-Fox release

JOHN L. RUSSELL, "The Indestructible Man," J. Pollexfen Prods.

TELEVISION

(The following directors of photography were active last month in photographing films for television in Hollywood, or were on contract to direct the photography of television films for the producers named.)

LUCIEN ANDRIOT, "Where Were You?," Ken Murray Productions, "It's a Great Life."

Raydee Corp'n, "The Life of Riley," Hal Roach Studios.

JOSEPH BIROC, "Treasury Men in Action," American National Studios, Inc., and "Dear Phoebe," Dear Phoebe Productions.

WILLIAM BRADFORD, "Gene Autry," Flying A Productions.

NORBERT BRODINE, "The Loretta Young Show," Lewislor Ent.

EDWARD COLMAN, "Dragnet," Sherry TV, Inc.

FLOYD CROSBY, "Authors Playhouse," Authors Playhouse Prods.

ROBERT DE GRASSE, "Make Room For Daddy," Marterto Prods., Inc, and "The Ray Bolger Show," B & R Ent.

GEORGE DISKANT, "Four Star Theatre," Four Star Productions, Inc.

E. B DUPAR, "Tim McCoy Show," Mercury-Int'l Pictures

HENRY FREULICH, "Captain Midnight, Screen Gems.

KARL FREUND, "I Love Lucy," "Willy" and "December Bride," and "Our Miss Brooks," Desilu Productions, Inc.

FREDERICK GATELY, "Mayor of the Town," Rawlins-Grant, Inc

AL GILKS, "The Halls of Ivy," Television Programs of America, Inc.

SID HICKOX, "Holiday In Rhythm," Mercury Int'l Inc

BEN KLINE, "Fireside Theatre," "An Argument With Death," Frank Wisbar Prods.

JACK MACKENZIE, "Public Defender," and "Passport To Danger," Hal Roach, Jr, Productions.

WILLIAM C MELLOR, "The Adventures of Ozzie And Harriet," Stage Five Prods., Inc.

ERNEST W. MILLER, "Rocky Jones, Space Ranger," and "Stu Erwin Show," Roland Reed Productions.

VIRGIL MILLER, "You Bet Your Life," Filmcraft Prods.

HAL MOHR, "That's My Boy," McCadden Corp'n

NICK MUSURACA, "Lineup," Desilu Prods, Inc

KENNETH PEACH, "Here Comes Donald," O'Connor Prods.

ROBERT PITTACK, "The Lone Ranger," CM TV Productions, Inc.

JOHN L. RUSSELL, JR., "Joe Palooka," Guild Films.

WILLIAM SICKNER, "The Whistler," Linda Ioy Pamons Productions.

MACK STENGLER, "Liberace," "Life With Elizabeth," "Florian Zabach Show," and the "Frankie Lane Show," Guild Films

HAROLD STINE, "Superman," Superman, Inc., "Cavalcade of America," "This is Your Music," Jack Denove Prods., and "Korla Pandit," Sonder Prods.

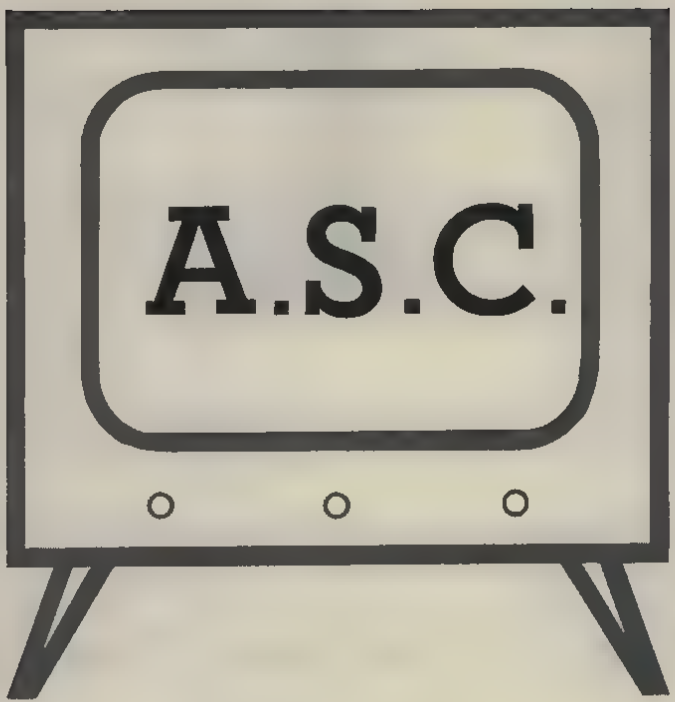
ALAN STENSVOLD, "Andy's Gang," Frank Ferrin Prods

WALTER STRENGE, "Waterfront," Roland Reed Productions, and "My Little Margie," Roach, Jr Reed Productions.

PHILIP TANNURA, "Burns And Allen Show" and "The Jack Benny Show," McCadden Corp'n.

STUART THOMPSON, "Lassie," Robert Maxwell Associates.

JAMES VAN TREES, "I Married Joan," Joan Davis Enterprises and "Hey, Mulligan," Mickey Rooney Enterprises.



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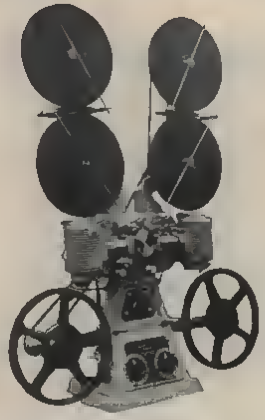

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(Continued from Page 633)

position for each scene, then waiting for the adult bird to return. Often the various scenes cannot be filmed in their proper sequence, but must be obtained whenever the desired action occurs. Subsequent editing of these scenes permits their rearrangement to creat a smooth, coherent feeding sequence. Other aspects of bird life may be treated in a similar manner to vastly improve the final bird movie as it appears on the screen.

Remember that no bird picture is worth taking if its filming means the death of the nestlings. Yet unless precautions are taken to protect the young, both during and after the filming session, death may overtake them. Careless destruction of the protective nest cover will reveal the young birds to predators. Merciless exposure to the hot summer sun will also cause death. Whenever it becomes necessary to remove branches or grass in order to photograph a nest, do it with care. *Tie* branches out of view—do not break them. When a nest is on the ground, carefully part the grasses and weeds about it. Avoid trampling the grasses so that they will not return to their original protective position. Finally, confine prolonged filming sessions to overcast days so that the young will not become sun-scorched. Fortunately the soft lighting so characteristic of overcast days creates bird movies possessing a softness and delicateness of color that is impossible to obtain beneath the harsh, contrasty light of the noonday sun.

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The U. S. Information Agency has issued its 5000th certificate as part of a program which helps American educational motion pictures get certain privileges, including customs facilitation and duty-free entry into a number of foreign countries. Certificate No. 5000 was recently issued to Walt Disney Productions for "Beaver Valley." The Agency certificates are issued on the basis of carefully developed and internationally accepted criteria.

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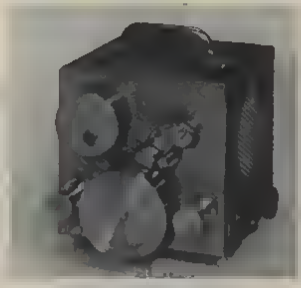

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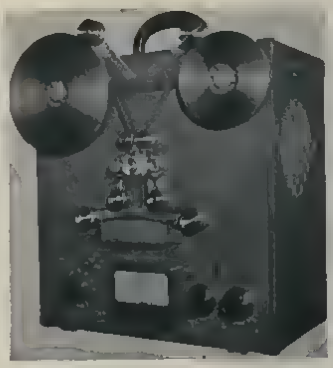

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TV FILM SERIES IN 16MM

(Continued from Page 617)

means of a brick enclosed in a canvas bag, which was suspended between the tripod legs. Resultant shots were smooth and steady.

We used regular Kodachrome film exclusively. We found that Precision Film Laboratories, Inc., in New York, give us excellent low-contrast prints from this stock. The ratio of 3-to-1 which we established for filming gave adequate footage and at the same time kept expenses down.

In order to provide fill light in shadow areas, we employed reflectors instead of booster lights. Two distinct types were used: when a "hot" fill-light was needed and could be used unobtrusively, we employed two 18 by 24 inch polished chrome ferrotype tins, such as photo finishers use in drying glossy prints. When a softer light was required, we used conventional reflectors with painted aluminum surfaces. These worked especially satisfactory whenever we were filming closeups, and particularly when we made shots of the black Model T Ford.

To make a series of tracking shots showing the Model T being driven along various roads, we mounted the Bolex camera in the open trunk compartment of a 1951 Pontiac, which served as our camera car. This was equipped with soft, over-sized tires and loaded with sand bags weighing a total of 300 pounds for ballast. Here the tripod was chained down securely to prevent undue camera motion. To further minimize any motion induced by movement of the car, the tracking shots were first made on an extremely smooth section of pavement. But as it turned out, the results were not too good; we needed more "bounce" in the motion of the Model T. It just didn't appear natural moving along the highway so smoothly. So to inject just the needed amount of motion to the car, we had an assistant run along behind the Model T — out of camera range, of course—and shake the car as it moved along during retakes. The effect was further enhanced by shooting these scenes at 16 instead of 24 frames per second.

All action in the picture was carefully planned to fit the needs and restrictions of television. Long shots were restricted to establishing shots only, and were especially conceived to establish direction of movement. We then concentrated on medium and closeup shots to carry the meat of the story.

Since the cast included principals with considerable television experience, the number of scenes for which it was necessary to do "dry runs" were reduced to a minimum. Lenka Peterson, who appears frequently in dramatic TV presentations played the leading role of the surprised Miss who finds the Model T Ford introducing himself to her. Co-starring with her was Jim Moran, as the bearded wandering ant hunter—who added humor as well as interest to the picture by relating interesting historical facts considered important in a TV film series designed for juvenile audiences.

It seems appropriate at this point to list some important credits: Henry Austin Clark, Jr., owner of the Long Island Automotive Museum, provided the venerable Model T. Co-producers of the film series and partners in Club Productions are E. Powis Jones, renowned artist, and John L. (Larry) Washburn, one-time summer stock company owner and lately a television writer and production supervisor. The author, with a background of television and business film photography, is chief cinematographer. Washburn also doubled as 2nd cameraman.

Our experience so far has shown that the key to success in filming this type production lies in careful pre-planning, coupled with plenty of on-the-spot creativeness. END

RADIO IN FILM PRODUCTION

(Continued from Page 609)

tical receiving antenna, which picks up the voice broadcast of the gaffer. The antenna line feeds into the receiver amplifier from which leads run to any number of speakers located around the stage.

Because the system is mainly used by gaffers to transmit instructions to electricians working on the catwalks overhead, the speakers usually are placed on the catwalks close to the workers. Thus, on large sets, it is possible for the gaffer to order changes made in light units without calling to his men above the din of other sounds being made on the stage or set. This is particularly advantageous also to the director and his cast, because he can carry on with rehearsals without the interference that otherwise would prevail where workers must call out to one another in a loud voice.

In the third photo at bottom of page 609, gaffer Chester Davis of Metro-Goldwyn-Mayer studios holds one of the speakers which is used at that studio to amplify messages relayed through the miniature wireless mike. Also shown is the wire brace which Davis designed to hold the mike away from his body and in a better position for pickup of sound. Here a simple antenna is used consisting of a short length of wire, which extends from the mike, up over Davis' left shoulder and down to his belt in back.

In the adjoining photos Kenneth Lang, chief set electrician at Twentieth Century Fox, is shown using the equipment. In photo at extreme left he is shown standing by the vertical receiver antenna. On this head he wears an extension of the transmitter antenna—a length of strong wire bent in a zig-zag design and connected to the regular antenna wire to improve transmission over long distances. In the center photo, Lang is giving instructions to electricians high above the stage floor without raising his voice above normal.

The equipment has other applications in film production also. Many of the studios already named have or are using the wireless mike in recording sound or dialog in filming scenes where use of a conventional microphone would not be practical, or for picking up sounds at distant points for stereophonic sound recording.

William Boyd (Hopalong Cassidy) uses the tiny mike-transmitter concealed on his person to record his words when being filmed in many action scenes, thus obtaining a realism in dialogue that could not be otherwise obtained.

The wireless mike illustrated here gives the utmost in studio quality of reproduction for regular sound recording, equaling and often surpassing conventional cable-fed microphones in signal-to-noise ratio as well as fidelity of response. The audio output of the receiver may be fed into standard microphone inputs; the Stephens mike is interchangeable with equipment presently in use.

The equipment was originally conceived for motion picture use when engineers at MGM came to Stephens Manufacturing Corp. technical men to solve a recording problem. Today, the studio has six of the units in use for both sound recording and as a means of communication by crew or production staffs on the sound stage or on location.

A complete unit of Stephens wireless microphone equipment consists of the four pieces pictured at the top of page 609. These are: combination power supply and monitor speaker, receiver, transmitter battery, and combination microphone-transmitter. Also included is the receiving antenna with floor stand, not shown.

The microphone is actually a miniature FM transmitting unit and is designed for high-fidelity sound pickup in stage, radio, television, motion picture and industrial applications. Frequency response is 30 to 12,000 cps ± 3db. Power requirement ranges from 1.1 to 1.5 volts, 0.1 amperes; or 35-60 volts, 0.01 amperes. Physical size of the microphone-transmitter is 3⅝ in. high, 2 in wide, depth 1 in; weight is 4 ounces. Price of the complete 5-piece combination transmitting and receiving system is around $980.00.

BIRDS OF A FEATHER

(Continued from Page 614)

of weather just to get a shot or two of wildlife that may be only a flash—but a vital one—on the screen. Like the time Dick and Ada squatted on a small rickety wooden platform built out on a lake, for eight to ten hours a day for ten days in a continuous drizzle—just to photograph a phase of bird life.

As Dick describes the incident, "It was a cold spring day in North Dakota. We had heard about the strange nuptial dance of the western grebes, and had journeyed to a remote lake for the purpose of recording the event on film. We set up our camera on the flimsy platform out on the lake and prepared to shoot whenever the birds went into action. But the weather immediately took a turn for the worse and during the next ten days it rained continuously, heavy black clouds hung low over the whole area. However, the grebes went about building their nests, courting, strutting, dancing and the business of raising their families—entirely unperturbed by the inclement weather. It was hopeless to waste film on the action for the light was insufficient for color photography. By the tenth day we hadn't exposed a single frame of film, so we gave up and drove back home to Regina—a distance of 200 miles."

The Birds no sooner arrived home than they received a telephone call that the weather at the lake had cleared and the sun was shining brightly. So they packed up their gear and retraced the arduous 200 miles back to the habitat of the grebes.

Before they could set up the camera, it had begun to cloud up again and it very quickly started to rain. During the ensuing 72 hours, 7½ inches of rain fell, raising the lake level way above the platform of the Bird's filming site.

Having come so far and believing that such weather could not last indefinitely, Dick and Ada stuck it out for another six days. The sun came out just as they decided to leave again. So they

(Continued on Page 640)

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BIRDS OF A FEATHER

(Continued from Page 638)

hurriedly set up the camera, made a few "sighting" or test shots, just to get the "feel" of the situation, then returned to their hotel with plans to get in a full day's shooting the next day.

"The weather prospects for the next few days seemed good," said Dick, "so we drove back to our hotel in good spirits. During the night we were awakened by a terrific thunderstorm but thought nothing of it, for such storms were common and usually of short duration. The next morning, with hopes high, we made our way to the lake to reap the rewards of our patience.

"We arrived at the nesting site, and a devastating spectacle greeted our eyes. There were no birds—no nests—nothing but our sagging, storm-wrecked camera platform standing as a grim reminder of the fruitless hours and days we had spent waiting to get the rare sequence of shots of the dancing grebes."

The wonder is that Dick and Ada Bird still pursue this field of cinematography, considering the many such experiences they have encountered during their photographic careers. The answer must lie, of course, in their innate patience—a quality which, next to basic photographic skill, is essential to successful nature and wildlife cinematography.

Where the studio cameraman has only the vagaries of crew and production staff to try his patience, the wildlife photographer inevitably has to contend with the capriciousness of the weather and the inability to direct his inarticulate subjects. Dick and Ada Bird's success in this field, therefore, points unmistakably to the importance unrelenting patience holds for any cinematographer electing to follow wildlife photography as a career.

MODELS AND MINIATURES

(Continued from Page 618)

edge himself far enough into a corner to obtain some apparent long shots of the train. To minimize the problems of the train's comparative screen speeds, he took the long shots at 16 f.p.s. and the close-ups at 24 f.p.s.

A 1500-watt lamp proved insufficient for the 20mm f/1.9 lens and the 2 in telephoto in the dark loft, and Kaulins supplemented it with a 500-watt photoflood. Much as he would like to work on 16mm neg-pos., financial considerations —in other words pocket money—mean that he has to be content with 9.5mm reversal. Though the American life of this gauge was brief, it is still very popular in Europe.

One advantage of Kaulins' interior set-up is that it can be left exactly as required for as long as necessary between shooting sessions without fear of wind or rain causing havoc. Some scenes, though, were decidedly best shot out of doors. The shots of the planes and the paratroopers needed a background of clouds, so Kaulins hung his models from a wire running the length of the garden and shot them against the sky from a low angle.

He used paper cut-out figures for closeups of the paratroopers and diminutive blobs on tiny paper parachutes for the long shots, which were actually taken from the same distance, of course. But he had reckoned without the wind. After several hours trying to get the few shots he needed he was left with several tangled lengths of cotton and a number of tattered paper figures.

He remade the figures, this time in cardboard, and again tried to shoot. The breeze still did its best to frustrate his attempts at filming the dangling paratroopers, but eventually his efforts were rewarded and he obtained all the material he required without a single twisting figure among the lot.

Scenes of the aircraft were easier. Kaulins had already taken a shot in the loft from the pilot's viewpoint as he swooped over the train. Now he wanted a shot showing the plane passing overhead. Efforts at bringing the model over the camera failed because of the side-to-side sway on the plane. Kaulins tried fixing the camera to the front of his bicycle and wheeling the machine towards the plane. This time the camera wobbled. Finally he broke every rule in the book by shuffling towards the model with the camera in his hands—and the results were perfect!

Another unorthodox idea came about as the result of Kaulin's need for a shot showing an aerial view of fields and hedges. After some thought he decided to try shooting directly down onto some crazy paving. Again the results exceeded his most optimistic expectations. The thin lines of cement between the stones look exactly like divisions between cultivated fields.

The success of *Victory Convoy* seems assured. Kaulin's work as an amateur since the age of fourteen has resulted in his election as Secretary of Focus Film Unit, one of the best known of Britain's numerous cine clubs. The Unit's production *Judgement in White* was recently awarded coveted prizes by both the Federation of Cine Societies and the Scottish Film Council. Kaulins was assistant cameraman on this 16mm drama.

At present Kaulins is studying to enter the film industry professionally.

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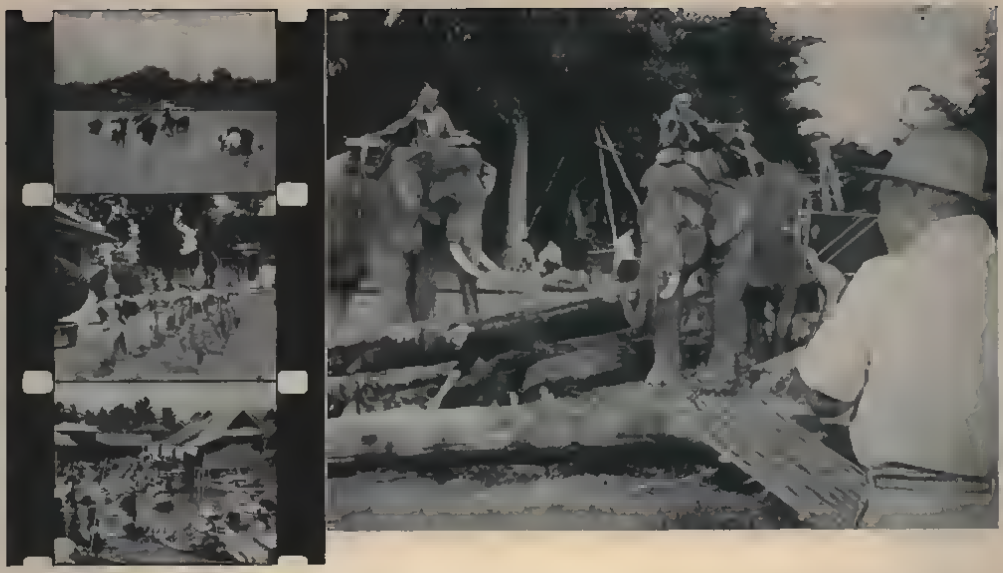

How Herbert Knapp captured a kingdom for Walt Disney's movie "Siam"

For Walt Disney's new "People and Places" series, Herbert Knapp, well-known cinematographer, explorer, scientist, and lecturer, took a fast plane to Siam. There, on square-cut emerald rice paddies . . . in the heart of lush jungles . . . in the royal court . . . and amidst river sampan traffic as jumbled as Fifth Avenue during the rush hour, he set up his Cine-Kodak Special II Camera and recorded life as he found it.

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